

What is claimed is:

1. A method of implanting a pressure measurement device in a heart of a patient, comprising the steps of:

providing a pressure transducer assembly comprising a pressure transducer and a pressure transmission catheter, the catheter having a proximal portion and a distal portion, the proximal portion connected to the pressure transducer, the distal portion having an opening with a barrier; and

positioning the catheter across a heart wall, with the opening disposed in a chamber of the heart.

2. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, further comprising the steps of:

providing an implantable telemetry unit;

connecting the telemetry unit to the pressure transducer assembly; and

implanting the telemetry unit in the patient.

3. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the heart wall includes myocardium, and wherein the positioning step comprises positioning the catheter across the entire myocardium.

4. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the chamber comprises a left ventricle, and wherein the positioning step comprises positioning the catheter across the heart wall with the opening disposed in the left ventricle.

5. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the chamber comprises a right ventricle, and wherein the positioning step comprises positioning the catheter across the heart wall with the opening disposed in the right ventricle.

6. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the heart wall comprises a ventricular septum, and wherein the positioning step comprises positioning the catheter across the ventricular septum.

7. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the pressure transducer assembly includes a housing containing the pressure transducer, further comprising the step of securing the housing to the heart wall.

8. A method of implanting a pressure measurement device in a heart of a patient as in claim 7, wherein the securing step comprises securing the housing outside the heart.

9. A method of implanting a pressure measurement device in a heart of a patient as in claim 7, wherein the securing step comprises securing the housing inside the heart.

10. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the positioning step comprises a surgical approach.

11. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the positioning step comprises a transluminal approach.

12. A method of implanting a pressure measurement device in a heart of a patient as in claim 1, wherein the proximal portion is relatively crush-resistant and the distal portion is relatively flexible, and wherein the positioning step comprises positioning the relatively crush-resistant proximal portion in the myocardium and the relatively flexible distal portion in the chamber.

13. A method of implanting a device, comprising the steps of:  
providing an implantable device comprising a telemetry unit connected to a pressure transducer assembly connected to a catheter; and  
implanting the device such that the catheter extends across a heart wall, with a distal end of the catheter disposed in a chamber of the heart and the pressure transducer assembly connected to the heart wall outside the chamber.

14. A method of implanting a device as in claim 13, wherein the heart wall includes myocardium, and wherein the positioning step comprises positioning the catheter across the entire myocardium.

15. A method of implanting a device as in claim 13, wherein the chamber comprises a left ventricle, and wherein the positioning step comprises positioning the catheter across the heart wall with the opening disposed in the left ventricle.

16. A method of implanting a device as in claim 13, wherein the chamber comprises a right ventricle, and wherein the positioning step comprises positioning the catheter across the heart wall with the opening disposed in the right ventricle.

17. A method of implanting a device as in claim 13, wherein the heart wall comprises a ventricular septum, and wherein the positioning step comprises positioning the catheter across the ventricular septum.

18. An implantable pressure transducer assembly, comprising:  
a pressure transducer; and  
a liquid filled catheter, the catheter having a proximal portion and a distal portion, the proximal portion connected to the pressure transducer, the distal portion having an opening with a barrier, wherein the proximal portion is relatively crush-resistant and the distal portion is relatively flexible.

19. An implantable pressure transducer assembly as in claim 18, wherein the relatively crush-resistant proximal portion has sufficient crush resistance to prevent collapse caused by myocardial contraction.

20. An implantable pressure transducer assembly as in claim 19, wherein the catheter includes a metallic tube extending through the proximal portion and a polymeric tube extending through the distal portion.

21. An implantable pressure transducer assembly as in claim 20, wherein the polymeric tube extends through the proximal portion and the distal portion.

22. An implantable pressure transducer assembly as in claim 21, wherein the metallic tube is disposed in the polymeric tube.

23. An implantable pressure transducer assembly as in claim 19, wherein the opening is disposed at a distal end of the catheter.

24. An implantable pressure transducer assembly as in claim 19, wherein the opening is disposed proximal of a distal end of the catheter.

25. An implantable pressure transducer assembly as in claim 19, wherein the barrier comprises a gel.

26. An implantable pressure transducer assembly as in claim 19, wherein the barrier comprises a membrane.

27. A blood pressure measuring system for measuring blood pressure in a heart of a patient, comprising:

an implantable pressure transducer assembly;

an implantable telemetry unit connected to the pressure transducer assembly via an electrical lead;

a local data collection system in communication with the implantable telemetry unit via a wireless link; and

a remote data collection system in communication with the local data collection system via a telecommunication system.

28. A blood pressure measuring system as in claim 27, wherein the telecommunication system comprises the Internet.

29. A blood pressure measuring system as in claim 27, wherein the wireless link comprises radio transmission.

30. A blood pressure measuring system as in claim 27, wherein the pressure transducer assembly includes a pressure transducer and a liquid-filled catheter connected to the pressure transducer.

31. A blood pressure measuring system as in claim 30, wherein the pressure transducer assembly further includes a housing containing the pressure transducer, the housing having means for connection to the heart.

32. A blood pressure measuring system as in claim 31, wherein the liquid-filled catheter includes a proximal portion and a distal portion, the proximal portion connected to the pressure transducer, the distal portion having an opening with a barrier.

33. A blood pressure measuring system as in claim 32, wherein the proximal portion of the catheter is relatively crush-resistant and the distal portion of the catheter is relatively flexible.

34. A method of diagnosing or monitoring congestive heart failure (CHF) or an underlying cause thereof, comprising the steps of:

providing an implantable device comprising a telemetry unit connected to a pressure transducer connected to a catheter;

implanting the device such that the catheter extends across a heart wall, with a distal end of the catheter disposed in a chamber of the heart and the pressure transducer connected to the heart wall outside the chamber; and

monitoring blood pressure in the heart chamber using the implantable device.

35. A method of diagnosing or monitoring congestive heart failure in a patient comprising:

placing a fluid filled catheter across the myocardium of the patient;  
coupling said fluid to an implanted pressure transducer mounted on the  
myocardium:  
telemetering data from the pressure transducer to a remote location outside the  
body of the patient;  
maintaining a data base of telemetered data over time to develop data trends for  
the patient;  
displaying the data to a physician for diagnostic purposes.

36. The method of claim 35, wherein said telemetering step includes:  
providing a base data collection station proximate the patient to communicate  
locally with said implanted pressure transducer;  
providing a remote data collection station to communicate with said base station  
to collect store reduce and display patient data to a physician.

37. The method of claim 35, wherein said telemetry step includes:  
providing an implantable telemetry unit coupled to a remote sensor module  
through a lead such that the sensor module may be affixed to the heart wall while the  
telemetry unit may be implanted abdominally or pectorally.

38. The method of claim 37, wherein said telemetry step includes:  
providing a home data collection station that is communicates with said telemetry  
unit over a short range.



39. The method of claim 38, wherein said telemetry step includes:  
providing a physician data collection station remote from said home station  
coupled to said home data collection station by a land based communication link.

40. The method of claim 35, wherein said displaying step includes:  
a physician operated menu driven data display system with a first set of standard  
templates for displaying data and a second set of custom templates for displaying data.

41. The method of claim 38, wherein said telemetered data is collected in  
approximately real time and compensated for barometric variation during collection by  
said home data collection station creating barometric compensated pressure data.

42. The method of claim 35, wherein said maintaining and displaying steps  
includes calculating from said barometric compensated pressure data at least one value  
selected from the group consisting of:

LVSP/LVDP; LVBDP; LVEDP; HR;  $LV_{max} + dP/dT$ ;  $LV_{max} - dP/dt$ ; Pulse  
LVP;  $dP/dT$ .

43. The method of claim 42, wherein said calculating step includes:  
maintaining a historical data set tracking computed variable for a patient over a  
time period of at least one month.

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